Dräger

Test Certificate

Micro Vent

File no.: 5673.100

Edition: 02.99

DrägerService

Explanation of Symbols

—	OK	C = Check condition
|	Defect/error/fault	O = Check function
◯	Spare parts used	L = Check for leaks
/	Report	V = Enter value
∩	Accessories missing	

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Installation site: _____

_____

_____

Serial no.: _____

Date of delivery/ startup: _____

Invoice no. or delivery no.: _____

Other: _____

1. Device, general

1.1 SW version

Read out under 4.3.2

1.2 Options as per rating plate not applicable

1.3 Operating hours not applicable

1.4 General condition

1.4.1	CS connecting hoses	C L									
1.4.2	Blender 8412411	C									
1.4.3	Connecting hose between mixer and nebulizer	C L									
1.4.4	Nebulizer	C									
1.4.5	Connecting hose between nebulizer and Micro Vent	C L									
1.4.6	DC/DC converter with connecting cable 8412071	C									
1.4.7	Power pack 12 V DC	C									
1.4.8	Battery holder 1835505	C									
	Connecting cable 8412072	C									
	Batteries (alkaline/manganese)	C									

1.4.9	Inspiration and expiration hoses with measurement lines 8410929	C L	
1.4.10	Expiration valve 8412610		
	Diaphragm 8410653	C	
	Tightly clamped		
	2 O-rings 2 x 8400827	C	
1.4.11	Y-piece 8405435	C	
	Thermometer 8412746	C	
	Flow sensor 8412034	C	
	Angle socket 8412235	C	
1.4.12	Microvent mount		
	Ventilator mounting8412560	C	
1.4.13	Hinged arm 8409609	C O	
1.4.14	Trolley 8412585	C O	

1.5 Device otpions/configurations not applicable

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2. Replacement of wearing parts

2.1 Open battery compartment

* Battery pack 8411599 (1000 mAh)
(replace every 2 years)

Next replacement:_____

2.2 Gas supply
Detach connection

* Filter (strainer) D 2316
(replace every 2 years)
Micro Vent as from SW 1.21:
2 filters upstream of R1/R8 (gas supply PEEP/ASB valve) and R5/R6 (rinse flow, flow measuring lines) and
2 sinter filters upstream of SV2 and SV3 (flow measuring line safety valves)
(replace every 2 years, posssible with S-set Filter 8414259)

Next replacement:_____

2.3 Pressure regulator

* Diaphragm
Tappet
(replace every 6 years)

Next replacement:_____

* Delivery pressure test
Only performed after component replacement or in the event of repair.

Test value:
Supply pressure (4.5 - 5.0)bar
P = 1.5 - 1.7 bar at a flow rate of 40 (38 - 42) L/min (DS mode test 21). C

2.4 Mixer

* Replace wearing parts with Bird accessory set (P/N 10003) every 3 years

Next replacement:_____

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3. Safety of operation

3.1 Fuses

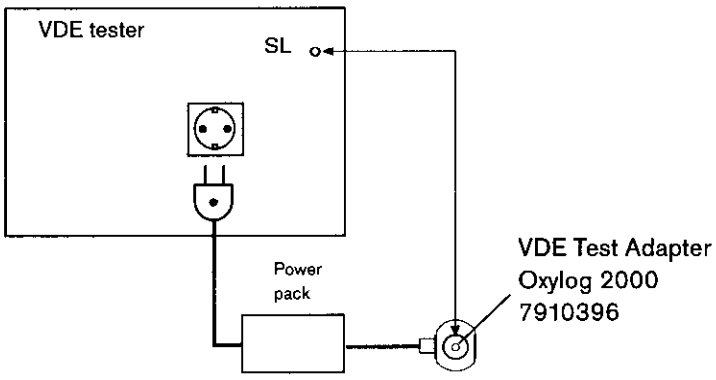
MicroVent: 1 A MT C

3.2 Device equivalent leakage current test for power pack 12 V DC

Follow-up measurements may exceed first-measured value by max. 50% and must likewise be ≤ 500 µA.

First-measured value: I_{leak} ≤ 500 µA C

Test set-up:



Note:
First-measured value is always to be transferred to a new TC.

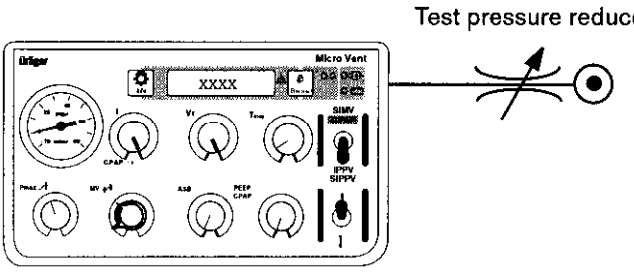
Test value:

VDE tester reading V

4. Functional test

4.1	Mixer	C	
4.1.1	Triggering of no-gas alarm O_2-concentration 60% Disconnect compressed-gas supply AIR		
	Test value: Acoustic alarm	O	
	Establish compressed-gas supply		
	Test value: Acoustic alarm stops sounding	O	
	Disconnect compressed-gas supply O_2		
	Test value: Acoustic alarm	O	
	Establish compressed-gas supply		
	Test value: Acoustic alarm stops sounding	O	
4.2	Flow measurement, nebulizer connection Blender setting 21% O_2 Flow rate approx. 3 L/min. at 5 bar supply pressure at blender	O	
4.3	MicroVent functional test in DS mode		
	Assemble unit Refer to appendix for entry into DS mode The following tests/measurements are performed in DS mode.		
4.3.1	Self-test Watchdog function		
	Test value: Unit must bleep twice in switch-on test	O	
4.3.2	Software version SW		
4.3.3	Switching point, pressure sensor, P-supply Call up DS test 2 and activate		
	Establish compressed gas supply without the Blender. Build up slow a flow rate with the test pressure reducer		

Test set-up:



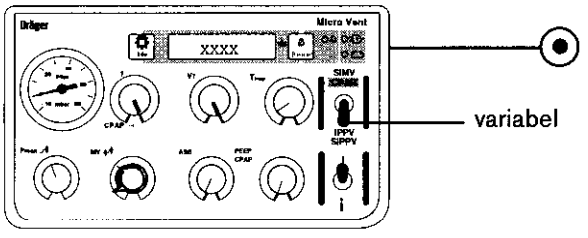
Test values:

Display: Pressure low	O	
Switching point = 1.3 (1.2 - 1.5) bar	O	
Display: Pressure high	O	

Terminate test 2

4.3.4 Pressure sensor P-LA with 3/2-way valve IPPV/CPAP
Call up DS test 3 and activate

Test set-up:
All other tests with the Blender, 5 bar gas supply and 21% O2 concentration. If used another configuration it is explicit told in the test.



Test values:

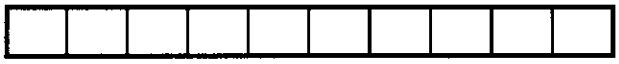
Switch setting	Display		
IPPV/SIPPV	IPPV/SIPPV	O	
SIMV/CPAP	SIMV/CPAP	O	

Terminate test 3

4.3.5 Reading the double potentiometer MV high, MV low.
Select DS test 4 and start test.

Test values::

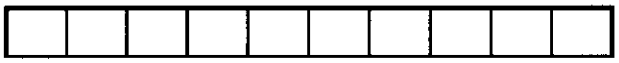
Potentiometer setting		Values displayed by MicroVent (tolerances)
MV high	2 L/min	1,9 bis 2,1 L/min
	10 L min	9,5 bis 10,5 L/min
	20 1/min	19,0 bis 21,0 L/min
MV low	2 L/min	1,9 bis 2,1 L/min
	10 L min	9,5 bis 10,5 L/min
	20 1/min	19,0 bis 21,0 L/min

O 

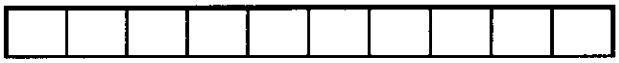
End DS test 4.

4.3.6 LCD display and alarms
Call up DS test 5 and activate

Test values:

LCD display: All pixels actuated O 

LCD display: Background illumination O

Horn LED and voltage LEDs light O 

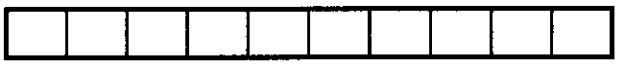
Horn on O

Terminate test 5

4.3.7 Read-in of potentiometers f, VT, T_{insp}, P_{max}
Call up DS test 6 and activate

Test values:

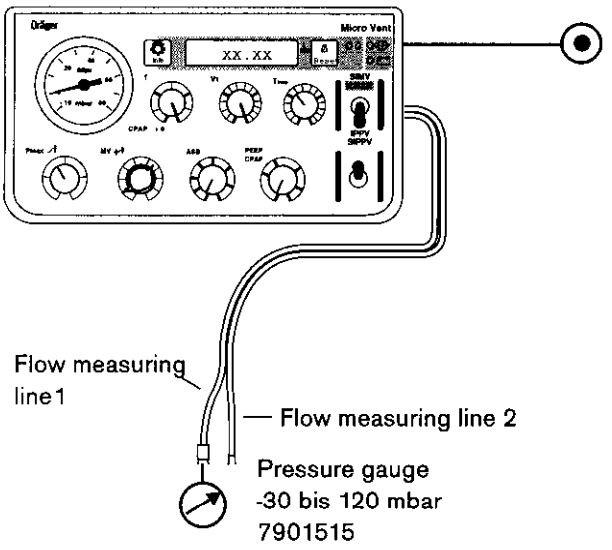
Potentiometer setting		Value indicated by Micro Vent (tolerances)
f	5 1/min	5.00 to 5.13 1/min
	10 1 min	9.88 to 10.07 1/min
	60 1/min	58.7 to 61.0 1/min
VT	0.1 L	0.10 to 0.11 L
	0.8 L	0.79 to 0.81 L
	1.5 L	1.48 to 1.50 L
T_{insp}	0.2 sec	0.18 to 0.22 sec
	1 sec	0.9 to 1.1 sec
	3 sec	2.8 to 3.2 sec
Pmax	20 mbar	20 to 20,6 mbar
	40 mbar	39.6 to 40.4 mbar
	60 mbar	59.4 to 60.0 mbar

O 

Terminate test 6

4.3.8 Checking safety valves (SV2, SV3) or flow measuring lines

Test set up:
Connect device (4.5 - 5.0) bar gas supply.
Close the two flow measuring lines one after the other using the pressure gauge.



Note:
If the pressure in any of the two flow measuring lines exceeds 90 mbar, remove the pressure gauge to prevent the pressure sensors (P_{aw} ΔP) or the internal pressure gauge from being damaged.

Test values:

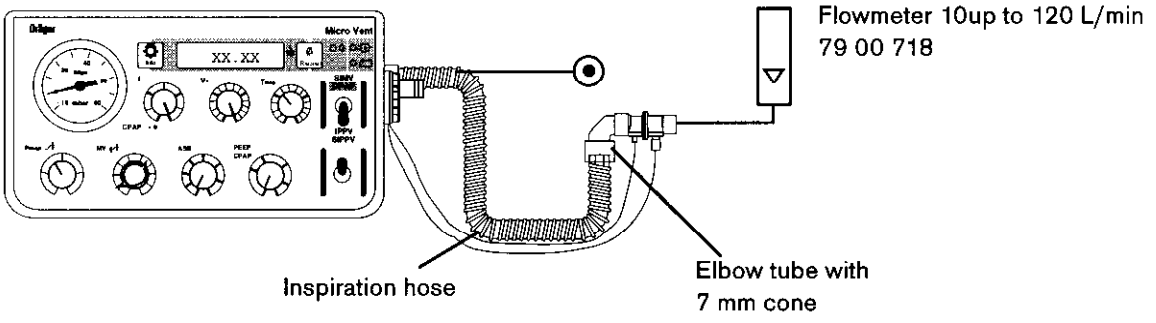
The pressure must reach the opening pressure within 15 seconds.

Opening pressure of SV2:: 70 to 90 mbar O V

Opening pressure of SV3: 70 to 90 mbar O V

4.3.9 Δ-P pressure sensor (flow measurement) Call up DS test 13 and activate

Test set-up:
Set flow by way of info (-) and Reset (+) keys and with external flow tube measure a flow of (15 +/- 0.5) L/min or (50 +/-1.0) L/min.



Test value:

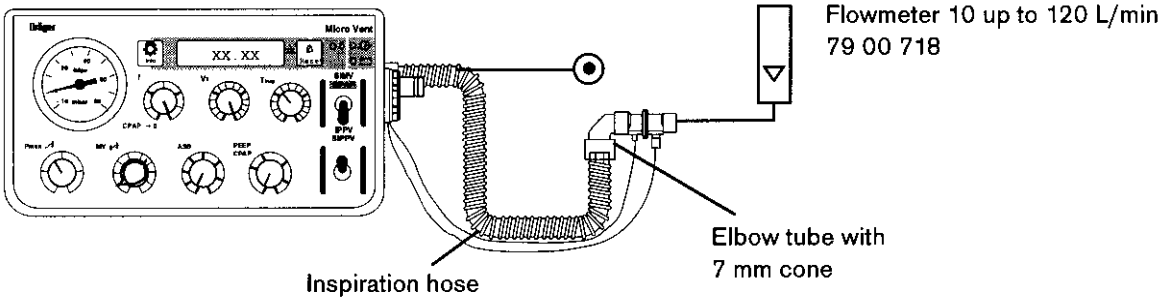
Display on unit (ACT);
-15 ± 1.5 L/min O

-50 ± 5 L/min. O

4.3.10 MV valve

Test set-up:
Seal off the exspirationsside of the Y-piece

Adjust flow with INFO-key (-) or RESET-key (+).



Test values:

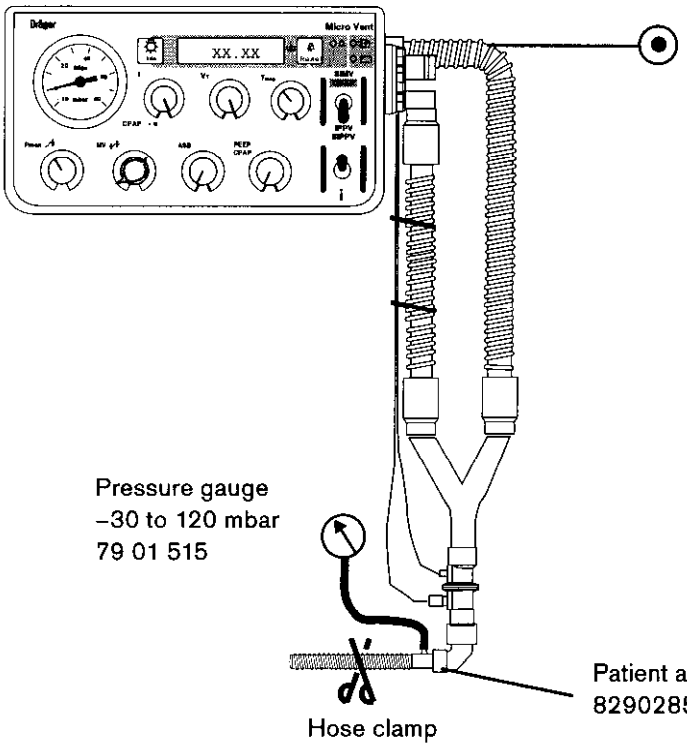
Settings	Value flowmeter	
(NOM)		
10 L/min	- 9.0 to -11.0 L/min	O
15 L/min (not SW 1.10)	-13.8 to -16.2 L/min	O
30 L/min	-27.6 to -32.4 L/min	O
50 L/min	-46.0 to -54.0 L/min	O
60 L/min (not SW 1.21)	-55.2 to -64.8 L/min	O
70 L/min	-64.4 to -75.6 L/min	O

End test 13

4.3.11 Paw sensor and pressure gauge Call up DS test 18 and activate

Test set-up:

Set low flow and use hose clamp to build up pressure of (40 -45) mbar



Test values:

Airway pressure reading on gauge and LCD may differ by ± 2 mbar from reference gauge O

4.3.12 Leak test

Test set-up: unchanged

Set flow rate of (25 +/-0.5) L/min. (measure with external flowmeter) Use hose clamp to build up pressure of (35 - 40) mbar downstream of Y-piece

Test value:

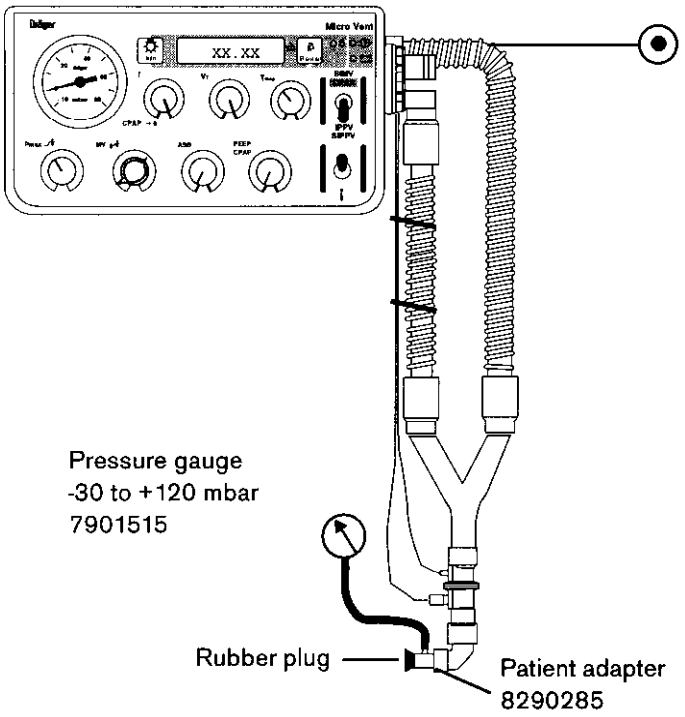
Flow must be 25 (23.0 - 25.0) L/min. O

Terminate test 18

4.3.13 Safety valve
Call up DS test 13 and activate

Test set-up:

Build up a flow and seal off Y-piece



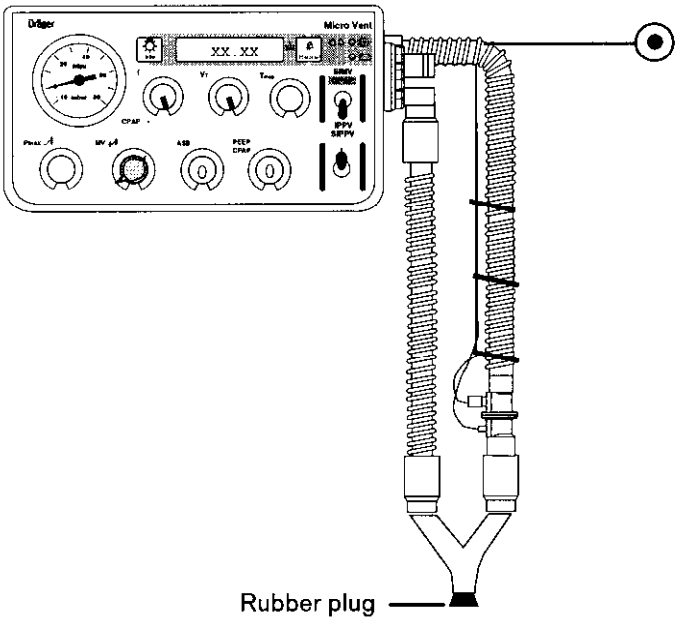
Test values:
Flow rate: 50 L/min
Opening pressure = 80 ± 10 mbar O V

From ARJL0000
Flow rate: 20 L/min
Opening pressure = 82 to 90 mbar O V

Terminate test 13

4.3.14 Testing of basic flow
Call up DS test 15 and activate

Test set-up:
Seal off Y-piece and flow sensor in expiration path



Test value

Display must indicate flow rate of -4 to -7 L/min. O V

Terminate test 15

4.3.15 Autozero function
Call up DS test 16 and activate

Test set-up: unchanged

Test value:

On pressing info and reset keys, autozero valve must be heard to switch on and off O

Terminate test 16

4.3.16 Expiration solenoid valve
Call up DS test 19 and activate

Test set-up: unchanged

Test value:

On pressing info and reset keys, expiration solenoid valve must be heard to switch on and off O

Terminate test 19

4.3.17 ASB valve
Call up DS test 20 and activate

Test set-up: unchanged

Test value:

On pressing info and reset keys, ASB valve must be heard to switch on and off O

Terminate test 20

Exit DS mode

4.3.18 Pressure switch PEEP-ASB (only from SW 1.21)
Call up DS test 25 and activate.

Test set-up: unchanged

Test value:
PEEP = 10 mbar, ASB = 5 mbar
"PRESS-SWITCH OFF" O

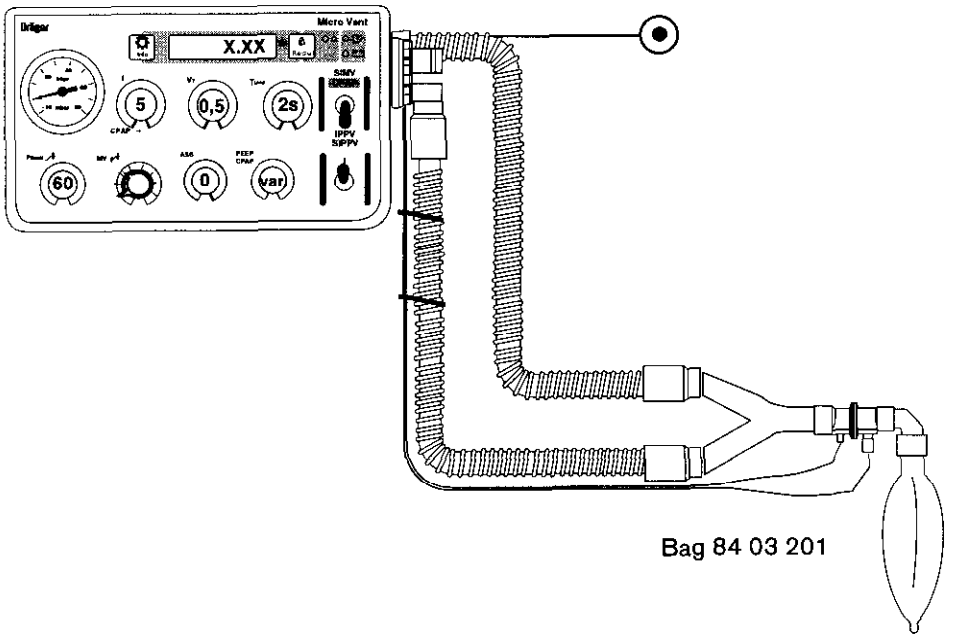
PEEP = 10 mbar, ASB = 15 mbar
"PRESS-SWITCH ON" O

4.4 MicroVent functional tests without DS mode

Assemble unit ready for operation, with power pack

4.4.1 PEEP setting

Test set-up:



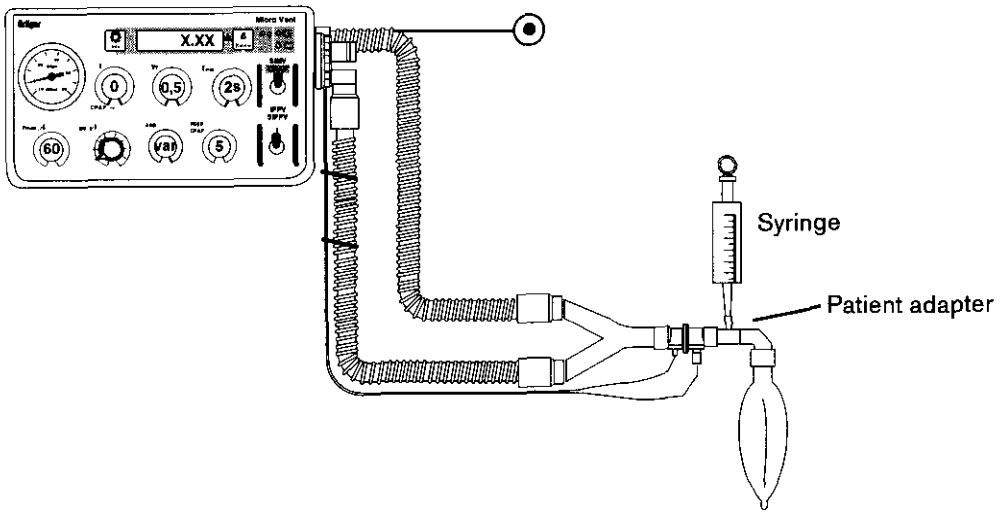
Test values:

There must be no visible oscillation on the internal manometer in the expiration phase.

PEEP		
5	3 - 6.5 mbar	O
10	8.5 - 11.5 mbar	O
15	13.0 - 16.5 mbar	O

4.4.2 ASB setting

Test set-up:



Settings: SIMV/CPAP, f = 0 1/min.,
PEEP = 5 mbar

Draw 60 ml injection volume within 0.4 seconds
ASB trigger is triggered

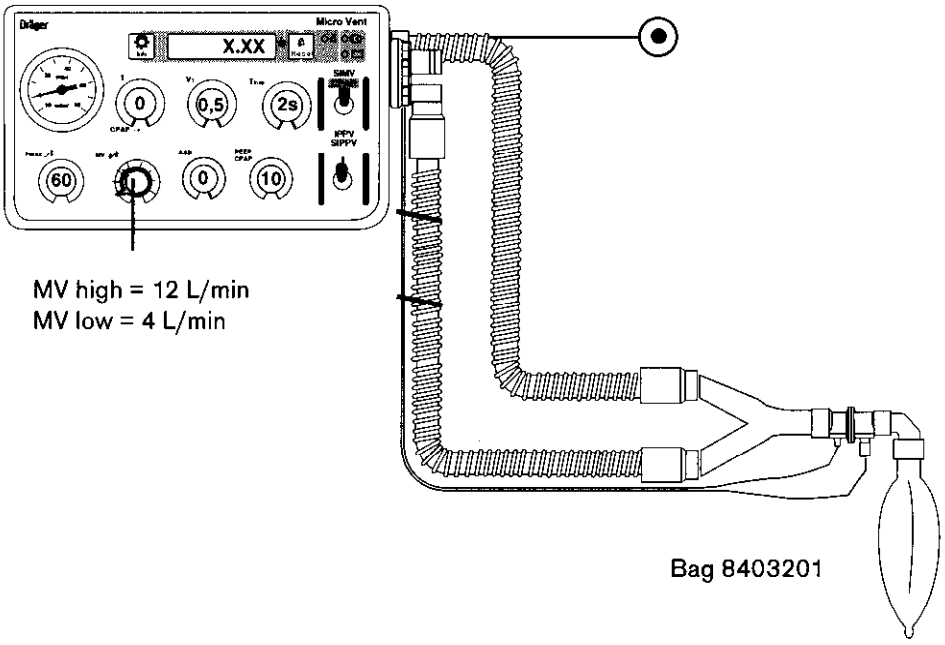
Test values:

ASB

10	8.5 - 12.5 mbar	O	
20	17.5 - 22.5 mbar	O	
30	26.5 - 33.5 mbar	O	

4.4.3 CPAP, SIMV with alarms MV low and high

Test set-up:



Squeeze test lung.

Test lung must inflate automatically within 7 seconds O

Set frequency to f = 10 1/min

Simulate breathing

Test value:

There must be a triggered ventilatory stroke (asterisk in LCD) O

Then generate alarms by altering MV-limits high and low

Test value:

Alarms given O

4.4.4 Check O_2 concentration

Test set-up: Unchanged, O_2 measurement in inspiration hose with Oxydig

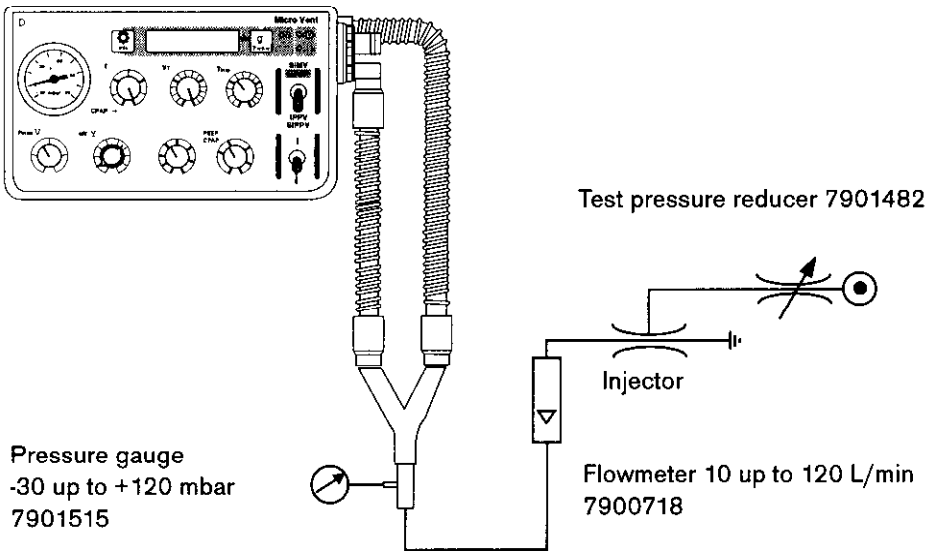
Test value:

Setting on blender	Measured O_2 concentration	
30% O_2	26.0% - 34.0%	O
60% O_2	56.0% - 64.0%	O
90% O_2	86.0% - 94.0%	O

4.4.5 Emergency air valve

Test set-up:
Switch off unit and interrupt compressed-gas supply

Generate suction rate of (20-25) L/min.

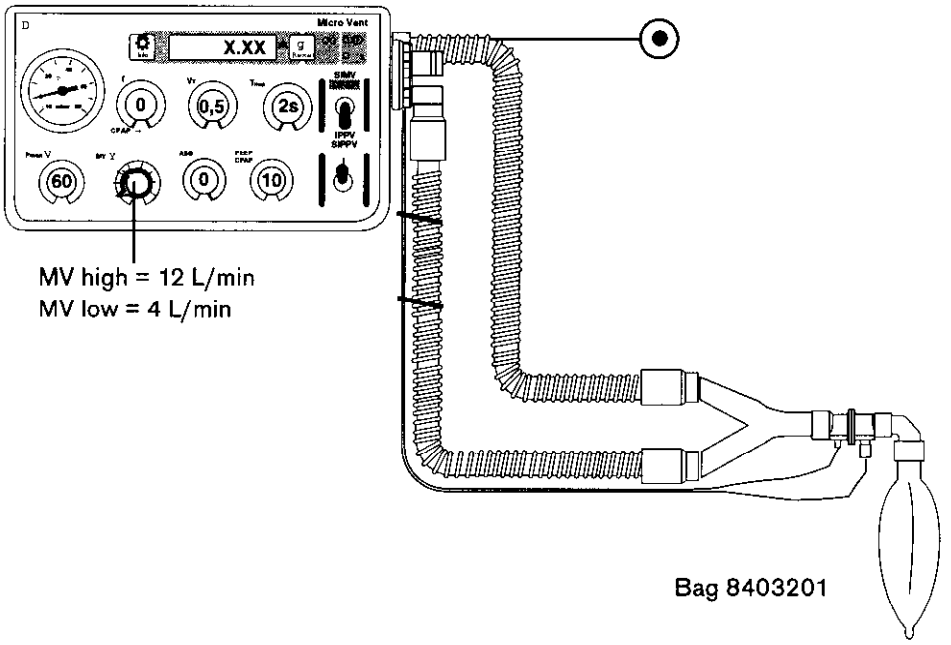


Test value:

Opening pressure = 0 to -5 mbar O

4.4.6 Final tests
Re-establish compressed-gas supply and switch on unit

Test set-up:



Test value:

MV 1= 6 ± 1 L/min. O
MV 2 = MV 1, tolerance: -0,4 L/min and
MV 2 = 6 ± 1 L/min

No alarms O

Then lower Pmax. limit until unit switches to expiration

Test value:

Switch to expiration (alarm Paw high) O

Increase Pmax limit again

Remove connection to power pack

Power failure alarm
The alarm can be acknowledged with the Reset key O

---

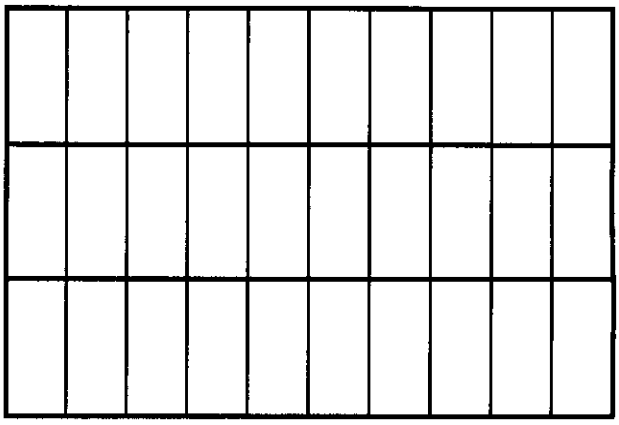
5. Place unit at the user's disposal ready for operation.

6. Test Certificate

Name:

Date:

Signature:



* These jobs are repair procedures which are not included in the coast of inspection.

7. Report:

8. Appendix

8.1 Test equipment

Test equipment: Micro Vent

Test pressure regulator	7901482
Flowmeter 10 - 120 L/min	7900718
Flowmeter 0.001 - 16 L/min	7901161
Manometer -30 - +120 mbar	7901515
Conical connector	8400904
Plug	7901297
Injector	7900930
Hose clamp	7900484
Bag	8403201
VDE portable measuring set	7900234
Oxydig	8304411
O2 connector	8412579
Test Adapter Oxylog 2000	7910396
Patient adapter	8290285
Syringe, empty	7901541

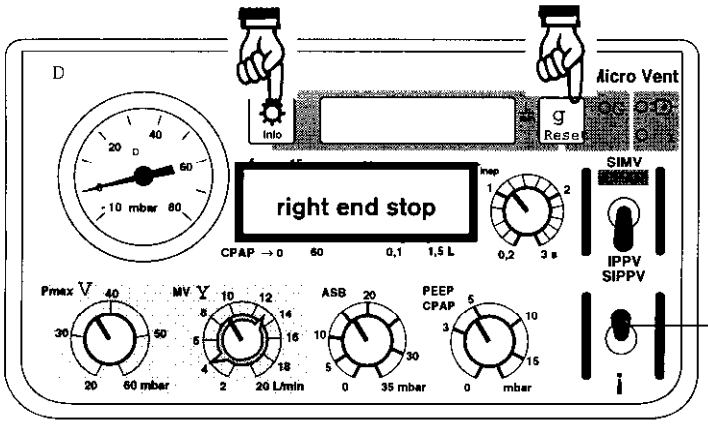
Additional kits for replacement of mixer (MicroBlender) non-repairable items:

MicroBlender Toolkit (P/N 03852)
Micro Blender Maintenance Kit (P/N 10003)

Please order the MicroBlender Toolkit (P/N 03852) and the MicroBlender Maintenance Kit (P/N 10003) directly from „Bird").

8.2 Starting the Extended Service Mode (ESM)

Press the info key and the reset key simultaneously



Display

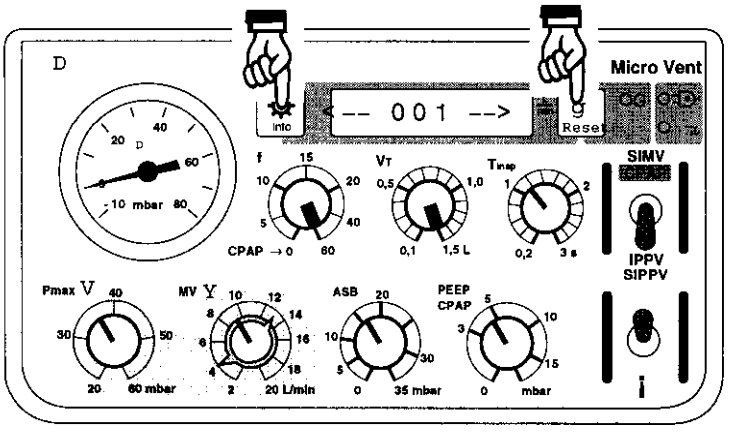
Self test SW Version XX.XX

Customer Service Mode (CSM)

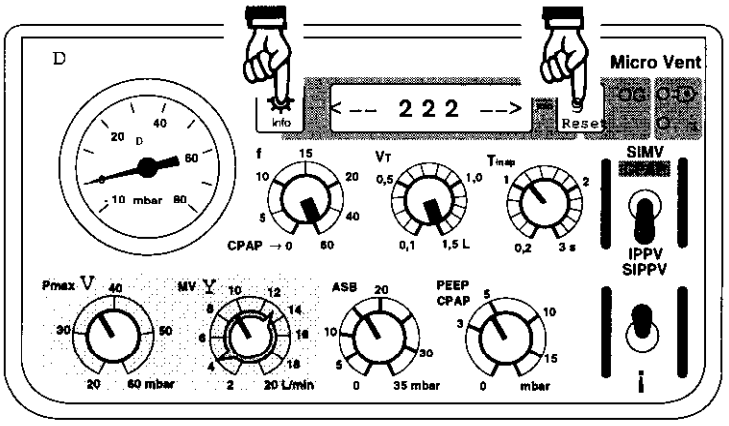
Relase the **Info key** and the **Reset key**

Adjust language <- 001 ->

Adjust the number "222" unsing the **Info key** or the **Reset key.**



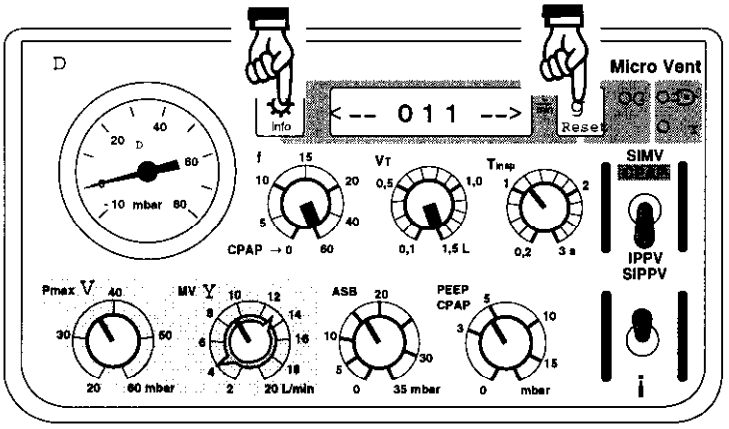
Press the **Infokey** and the **Reset key** simultaneously for approx 5 seconde..



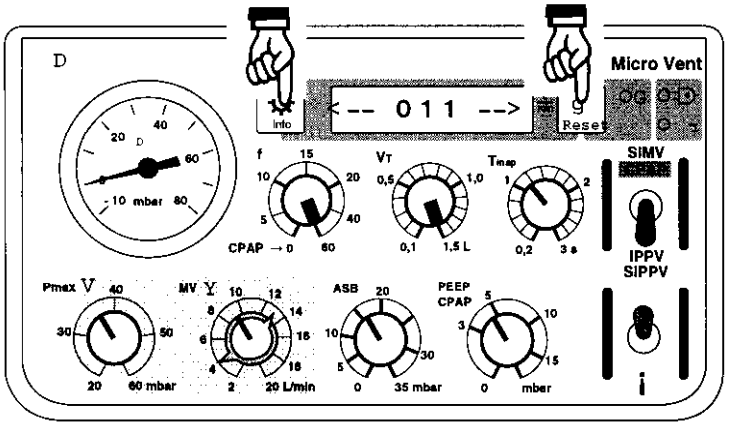
Display

Extended Dräger Service-Mode

Select the desired test with the **Info key** or the **Reset key.**



Press the **Info key** and the **Reset key** simultanously to activate the desired test



Exiting the Extended Service Mode (ESM)

Switch the Micro Vent off and on again to return to the Micro Vent normal operating mode.